Fusion Brief

Preamble

- Nuclear South West set up about 5 years ago and successfully brings together Academia, Industry and public sector around a common purpose: To champion the SW nuclear industry as the premier place for investment, innovation and growth
- Our early years were focused on Hinkley Point C but recently, we have been working to ensure a lasting legacy for the South West. One area we have been exploring is advanced nuclear technologies, specifically Fusion technology.
- Our aspiration to be become an international hub for Fusion technology has now transformed itself in to specific, time bound, opportunity; The Government's recent announcement that it wants the UK to be the home of the first Fusion Power Plant producing electricity by 2040 – a truly moon-shot project
- Govt has backed up this announcement with an initial £220M for a Fusion Technical Centre, that will be the pre cursor to the construction of the power plant itself – STEP Programme
- The citing process for the technical centre has begun and letters have been sent to every LA CEO in England informing them of this.
- The SW is uniquely placed to take advantage of this once in a generation opportunity and therefore very keen to support SW bids and particularly those from LA's with existing licenced nuclear sites in their areas (Berkeley, Oldbury, Hinkley Point A, Winfrith)
- The approach of NSW at this early stage is to engage with LAs and explore the opportunity with them.

Overview of Fusion Introduction

Although we class Fusion as an advanced nuclear technology, it is fundamentally different to the nuclear Fission technology we use today. Here is a brief summary:

Advantages of fusion power
With increasing concerns over climate change and finite supplies of fossil fuels, we need new, better ways to meet our growing demand for energy. The benefits of fusion power make it an extremely attractive option:

- ***No carbon emissions.*** The only by-products of fusion reactions are small amounts of helium, an inert gas which can be safely released without harming the environment.

- ***Abundant fuels.*** Deuterium can be extracted from water and tritium will be produced inside the power station from lithium, an element abundant in the earth's crust and seawater. Even with widespread adoption of fusion power stations, these fuel supplies would last for many thousands of years.

Nuclear South West, Leigh Court Business Centre, Abbots Leigh, BS8 3RA, UK

- ***Energy efficiency.*** One kilogram of fusion fuel could provide the same amount of energy as 10 million kilograms of fossil fuel. A 1 Gigawatt fusion power station will need less than one tonne of fuel during a year's operation.

- ***Less radioactive waste than fission.*** There is no radioactive waste by-product from the fusion reaction. Only reactor components become radioactive; the level of activity depends on the structural materials used. Research is being carried out on suitable materials to minimise decay times as much as possible.

- ***Safety.*** A large-scale nuclear accident is not possible in a fusion reactor. The amounts of fuel used in fusion devices are very small (about the weight of a postage stamp at any one time). Furthermore, as the fusion process is difficult to start and keep going, there is no risk of a runaway reaction which could lead to a meltdown.

- ***Reliable power.*** Fusion power plants will be designed to produce a continuous supply of large amounts of electricity. Once established in the market, costs are predicted to be broadly similar to other energy sources.

Nuclear South West Team

Tom Scott: Is RAEng Professor of Materials at the University of Bristol and Director of the South West Nuclear Hub. His research is based around ageing, corrosion and characterisation of radioactive materials in engineered and environmental systems. He is the academic lead for the Sellafield UK Centre of Expertise for Uranium and Reactive Metals. Work with Sellafield has successfully developed and deployed two novel radiation detection technologies in the past 5 years, including the Advanced Airborne Radiation Monitoring (AARM) system.

Andy Bates: Innovation Manager, Business West
Andy is the industry lead for Nuclear South West, with over 20 years of experience leading on international collaboration projects. He is a manufacturing engineer by training, with a deep understanding of both technical and business innovation. He has also been a founder and worked in several technology start-ups.

Jamie Townes: Partnership Manager, South West Nuclear Hub